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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/634,215	08/05/2003	Thomas P. Allen	L00501.70040.US	6836
7590	05/18/2005		EXAMINER	
James H. Morris Wolf, Greenfield & Sacks, P.C. 600 Atlantic Avenue Boston, MA 02210			GAGLIARDI, ALBERT J	
			ART UNIT	PAPER NUMBER
			2878	

DATE MAILED: 05/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary	Application No.	Applicant(s)	
	10/634,215	ALLEN ET AL.	
	Examiner	Art Unit	
	Albert J. Gagliardi	2878	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-56 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-56 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>4/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of the invention of Group I in the reply filed on 10 March 2005 is acknowledged.

The examiner notes however, that contrary to applicant's assertion, the amendments do not result in all claims being either linking claims or claims belonging to Group I. In the restriction, the examiner has considered the claims as being directed to three distinct inventions: one for determining a variation of an offset calibration parameter (the elected invention); one for determining a variation in a gain parameter; and a third related to a combination invention for determining both offset and gain parameters. Other claims were considered linking claims.

Comments on Election

2. As noted by the examiner previously, linking claims are generally examined along with the elected invention. Although there are different types of linking claims, many linking claims (including the original linking claims in this application) more or less conform to a generic claim. That is, at least from a preliminary review, they do not appear to define a patentably distinct invention by themselves, but encompass aspects of the more specifically recited claims that do seem to relate, again based only on a preliminary review, to inventions that may be separately patentable.

Applicant should be aware that claims are not designated as linking claims and/or claims related to separate inventions based on their independence and/or dependence, but on their content. If the claims recite content considered to relate to any one of the restricted inventions, then they will be deemed to directed to that invention, regardless of their dependency. If on the

other hand, the claims do not recite any subject matter that is specifically related to the restricted inventions (i.e., they do not appear from a preliminary review to recite any patentable subject matter), but includes subject matter that encompasses the restricted inventions, they may be considered linking claims, regardless of their dependency.

To better understand the relationship, it may be helpful to consider that every claim, even a dependent claim, may be rewritten as an independent claim (and is considered as such by the examiner) without changing the scope of the claim. In the current application, rewriting claims 1-6, for example, as independent claims, it will be observed that each of rewritten claims 1-9 recites at least a plurality of pixels, a temperature sensor, and a means for determining a calibration parameter, but that some of the rewritten claims further define the invention.

Claims 8 and 9, for example, further define the invention as being sensitive to infrared or thermal radiation; hardly a seemingly patentable or important distinction over claim 1 (one may have already assumed based on the other limitations that the invention would be more useful as an infrared and/or thermal imaging device). Claims 2 and 3, however further define that inventions wherein the calibration parameter is either an offset variation, or a gain variation; each one relating to a unique problem associated with radiation detectors which could represent, from a preliminary review, a unique improvement over the prior art.

Comments on Examination of Elected Claims

3. During examination, it appeared to the examiner that there was no patentable distinction between claims relating to an offset parameter and claims relating to a gain parameter. As such, the examiner has considered all the claims including the non-elected claims. Should applicant traverse the below rejections on the ground that inventions relating to an offset variation; a gain

variation or both variations do represent patentably distinct inventions which may be patentable for its their own reasons, applicant should limit their response to only claims that relate to the elected invention (i.e., inventions that related only to an offset variation) or the linking claims (i.e., claims that only generically recite a calibration parameter).

Information Disclosure Statement

4. Where the IDS citations are submitted but not described, the examiner is only responsible for cursorily reviewing the references. The initials of the examiner on the PTO-1449 indicate only that degree of review unless the reference is either applied against the claims, or discussed by the examiner as pertinent art of interest, in a subsequent office action. See Guidelines for Reexamination of Cases in View of *In re Portola Packaging, Inc.*, 110 F.3d 786, 42 USPQ2d 1295 (Fed. Cir. 1997), 64 FR at 15347, 1223 Off. Gaz. Pat. Office at 125 (response to comment 6). Consideration by the examiner of the information submitted in an IDS means that the examiner will consider the documents in the same manner as other documents in Office search files are considered by the examiner while conducting a search of the prior art in a proper field of search. The initials of the examiner placed adjacent to the citations on the PTO-1449 or PTO/SB/08A and 08B or its equivalent mean that the information has been considered by the examiner to the extent noted above. MPEP § 609 (Eighth Edition, August 2001).

The examiner notes that due to the unusually large number of references cited, and the absence of any description of the relevance of the references, it should be assumed that only the most cursory review of the cited documents consistent with these guidelines has been performed. If applicant is aware of any information that might be of particular relevance, it should be pointed out in order to insure a higher degree consideration.

Claim Objections

5. Claim 10 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

As noted below, claim 10 includes a negative limitation of not requiring an initial calibration at more than one temperature. The examiner also notes that since the initial calibration is not a part of the imaging system, it is unclear how the limitation further limits the imaging apparatus.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claim 10, 28, and 39-50 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claim 10 rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential elements (steps), such omission amounting to a gap between the elements. See MPEP § 2172.01. The omitted elements are: means for performing calibration where the initial calibration is performed at no more than one calibration temperature. The examiner notes that the limitation of “no more than one calibration temperature” amounts to a negative limitation. While it is noted that negative limitations are not indefinite *per se*, it is necessary that the boundaries of patent protection sought by the claim must be clear. In this case, it is not clear

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what elements (i.e., means) for determining a variation of the calibration parameter result in the “means for determining” *not* requiring an initial calibration at more than one calibration temperature. It is also not clear (see objection to claim above) what elements, if any, result in a further limitation of the claim.

9. Claim 28 recites the limitation “receiving scene radiation . . . a third time” There is insufficient antecedent basis for this limitation in the claim. The examiner notes that while there is an antecedent basis for receiving radiation at first and second times when the pixel is shielded, there is no antecedent basis for receiving scene radiation at first and second times.

10. Claim 39 recites the limitation “the pixel” in at least lines 2, 3, 4, 5 and 6. There is insufficient antecedent basis for this limitation in the claim. The examiner notes that there is no antecedent basis for and pixel.

11. Claim 39 is also rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps. See MPEP § 2172.01. The omitted steps are: any steps that put the claim in context, such as “calibrating an imaging apparatus” and “providing a thermal sensor.” The examiner notes that without any steps or structure to put the method in context (without improperly importing limitations from the disclosure), the claim is too vague and indefinite to allow one to adequately ascertain the scope of applicant’s invention.

12. Claim 40 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 40 includes a limitation of “determining a change in temperature of the pixel between second and third times based solely on a change in scene radiation” This

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limitation is unclear. It is unclear if the claim is meant to mean a step of actually determining a temperature change, or rather a step of determining what part of the temperature change was caused by scene radiation as distinguished from other causes such as a change in ambient temperature.

13. Claims 40-50 are rejected on the basis of their dependency on indefinite claims 39 and 40.

Claim Rejections - 35 USC § 102

14. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

15. Claims 1-5, 8-9, 11-14, 16-19, 39, and 51-55 are rejected under 35 U.S.C. 102(e) as being anticipated by Howard (US 6,433,333).

Regarding claim 1, *Howard* discloses (Figs. 1-3) an imaging apparatus comprising: a plurality of pixels (inherent aspect of focal plane array 12) to detect radiation and to output image signals (22) based on the detected radiation; a temperature sensor (R1) to detect an ambient temperature (col.5, lines 6-17); and means (16), coupled to the plurality of pixels and the temperature sensor, for determining a variation of a calibration parameter of a pixel (detector element) during operation of the imaging apparatus after an initial calibration procedure (col., lines 60-67).

Regarding claim 2, *Howard* discloses that the means for determining a variation of a calibration parameter comprises means for determining a variation of an offset of the pixel (col. 1, lines 60-62).

Regarding claim 3, *Howard* discloses that the means for determining a variation of a calibration parameter comprises means for determining a variation of a gain (response) of the pixel (col. 1, lines 60-62).

Regarding claim 4, *Howard* discloses that the means for determining a variation of a calibration parameter is actuated to determine the variation of the calibration parameter when a predetermined time period has elapsed (col.4, lines 41-54).

Regarding claim 5, *Howard* discloses that the means for determining a variation of a calibration parameter is actuated to determine the variation of the calibration parameter when a predetermined ambient temperature change has occurred (col.4, lines 26-35).

Regarding claims 8-9, *Howard* discloses that the pixels are sensitive to infrared (i.e., thermal) radiation (col. 1, line 6).

Regarding claims 11-14 and 16-19, the method recited according to the claims is suggested by the apparatus as disclosed by *Howard* as applied above, and is rejected accordingly.

Regarding claim 39, the method recited according to the claim is suggested by the apparatus as disclosed by *Howard* as applied above (see also *Howard* at col. 2, lines 37-62; and col. 4, lines 24-40), and is rejected accordingly.

Regarding claims 51-55, the apparatus recited according to the claims is suggested by the apparatus as disclosed by *Howard* as applied to the claims above, and is rejected accordingly.

Claim Rejections - 35 USC § 103

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

18. Claims 6-7, 10, 15, 20, and 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Howard*.

Regarding claim 6, *Howard* discloses that the means for determining a variation of the calibration parameter comprises at least one processor (16) and wherein the at least one processor is programmed to perform an act of: calculating a variation of an offset calibration parameter for the pixel based on a change in signal (S) of the pixel over a time period and a change in the ambient temperature (T) of the pixel over the time period (col.2, lines 54-64; and col. 3, lines 31-42). *Howard* further discloses that the detectors may be resistance bolometers (col. 7, lines 46-51). Those skilled in the art appreciate that an inherent property of resistance bolometers is that a change of signal level of a pixel inherently corresponds to a change in the resistance of the pixel. Therefore, absent some degree of criticality, it would have been an

obvious, if not inherent, design choice to characterize the variation of the calibration parameter as determined by a change in signal level as a variation based on a change in resistance of the pixel over a time period in view of the known relationship between signal level and resistance in bolometer type detectors.

Regarding claim 7, in the apparatus as suggested by *Howard* as applied to claim 6, the variation of the calibration parameter is a change in a resistance of the pixel caused by a change in an ambient temperature.

Regarding claim 10, as best understood, *Howard* discloses that the initial calibration is performed at multiple temperatures to compensate for response non-linearity of the detector over a broad dynamic range, thereby allowing improved precision. Those skilled in the art appreciate that the change in response and/or resistance of a detector element for a change in temperature is a physical property of the detector which depends strongly on the Temperature Coefficient of Resistance (TCR) of the detector element, which is also a physical property. As such, absent some degree of criticality, it would have been obvious design choice within the skill of a person of ordinary skill in the art to modify the system as suggested by *Howard* to rely on an initial calibration at only a single temperature with the response at other temperatures being approximated based on the known physical properties, in order to allow for a system which requires a simpler initial calibration, albeit at the expense of increased dynamic range and/or precision, depending on the needs of the particular application.

Regarding claim 15, the method recited according to the claim is suggested by the apparatus as suggested by *Howard* as applied above, and is rejected accordingly.

Regarding claim 40, as best understood, in the method of measuring infrared radiation as suggested by *Howard*, the steps of performing temperature compensation inherently results in a signal output that represents a change in the temperature of the pixel, which as a result of the temperature compensation, is based solely on a change in scene radiation using the offset calibration parameter (see explanation regarding claim 1) and a resistance of the pixel measured at a third time (see explanation regarding claims 6-7 above).

Regarding claim 41, as best understood, *Howard* further discloses the determining is based on steps including multiplying by a gain calibration parameter and adding an offset (col. 3, lines 31-37-43).

19. Claims 21-38, 42-50, and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Howard* as applied above, and further in view of Butler (WO 01/84118 A2).

Regarding claim 21, *Howard* discloses that in order to compensate for slow temporal drift and thereby further improve response and offset calibration compensation, conventional calibration may be performed at startup and further as desired (col. 4, line 65 to col. 5, line 5).

Regarding the conventional calibration as known in the art, *Butler* discloses a method wherein conventional calibration may also include shielding a pixel from radiation at a first time and a first temperature (see generally page 29, line 13 to page 31, line 2; shielding a pixel from radiation at a second time and a second temperature (see generally page 31, line 3 to page 32, line 5); calculating a first calibration parameter using the resistance of the pixel and the ambient temperature at the first time and the second time (page 29, line 13 to page 32, line 5); and determining a second calibration parameter (page 31, line 29 to page 32, line 14) wherein the

calibration parameter may be any of a coarse or fine offset correction factor and/or a gain correction factor (see generally page 29, line 18 to page 32, line 14).

Note: While *Butler* considers that the parameter may conceptually be considered as a change in voltage (col. 31, line 26), those skilled in the art appreciate that such voltage change is inherently based on a change in the resistance of the bolometer type detector. Additionally, regarding the calibration parameter being a gain calibration factor, those skilled in the art appreciate that

Regarding claim 22, *Butler* suggests that the calculation of the first parameter includes determining a change in resistance (inherent aspect of the measured change in voltage) of the pixel between first and second times relative to a change in ambient temperature (page 31, line 25 to page 32, line 14).

Regarding claim 23, *Butler* suggests that the calculating further comprises generating a temperature difference relative to a resistance difference (as measured by a voltage difference).

Regarding claim 24, *Butler* suggests that the acts of shielding comprise shutter operations (page 29, line 16).

Regarding claim 25, *Butler* suggests that the act of determining a second calibration parameter includes a third shielding operation followed by a calculation of a second parameter and updating the calibration parameter (page 32, lines 15-23).

Regarding claim 26, *Butler* suggests that the first pixel is one of an array of pixels and the calibration is performed for a second pixel (page 29, lines 22-26).

Regarding claim 27, in the method suggested by *Howard* as modified in view of *Butler*, *Howard* discloses that the measuring of the ambient temperatures comprises measuring substrate

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temperatures (col. 5, lines 8-18) and *Butler* further suggests that the acts of calculating comprises using the resistance (as manifested by a measurement of voltage) at first and second times (page 31, line 25 to page 32, line 14).

Regarding claim 28, as best understood *Butler* suggests that further suggests receiving shielded scene radiation a third time (page 32, lines 15-23).

Regarding claim 29, *Butler* suggests that the first pixel is one of an array of pixels and the calibration is performed for a second pixel (page 29, lines 22-26).

Regarding claim 30, in the method suggested by *Howard* as modified in view of *Butler*, *Howard* discloses that the calibration parameter is applied to correct a gain (response) error (col. 5, lines 1-5).

Regarding claim 31, in the method suggested by *Howard* as modified in view of *Butler*, *Howard* discloses that the applying (i.e., as often as desired) includes applying the second calibration parameter to an output signal to correct the gain (response) error (col. 5, lines 1-5).

Regarding claim 32, in the method suggested by *Howard* as modified in view of *Butler*, *Howard* discloses that the applying includes applying the second calibration parameter to an operating output signal to correct the gain (response) error (col. 5, lines 1-5). *Howard* further discloses that implementation may be in other forms (col. 8, lines 38-45). Those skilled in the art appreciate that other forms of implementation of gain and offset correction include applying the calibration parameter to an operating parameter (see for example *Butler* at page 1, lines 12-14, teaching that the calibration parameter may be applied to either an operating parameter and/or an output signal).

Regarding claims 33-38, the apparatus as recited according to claim 33-38 is suggested by the method suggested by *Howard* and *Butler* as applied at to claims 21-31 above and is rejected accordingly.

Regarding claims 42-50 and 56, the method as recited according to claims 42-50 and 56 is suggested by the method and apparatus as suggested by *Howard* and *Butler* as applied above and is rejected accordingly.

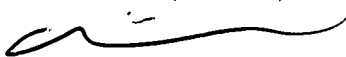
Conclusion

20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Albert J. Gagliardi whose telephone number is (571) 272-2436. The examiner can normally be reached on Monday thru Friday from 9 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

22. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Albert J. Gagliardi

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AJG